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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/797,661	03/10/2004	Kei Hiruma	9319G-000730	3945

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HARNES, DICKEY & PIERCE, P.L.C.
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EXAMINER

SCHUCHTER, ANDREW M

ART UNIT	PAPER NUMBER
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2871

MAIL DATE	DELIVERY MODE
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12/28/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

JH

Office Action Summary	Application No.		Applicant(s)	
	10/797,661		HIRUMA, KEI	
	Examiner		Art Unit	
	Andrew Schechter		2871	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 03 December 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 16, 17, 20, 22, 27 and 28 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 16, 17, 20, 22, 27 and 28 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 10 March 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|----------------------------------------------------------------------------------------|-------------------------------------------------------------------|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>12/3/07</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Request for Continued Examination

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 26 September 2007 has been entered.

Response to Arguments

2. Applicant's arguments filed 26 September 2007 have been fully considered but they are not persuasive. Applicant's arguments have been considered but are moot in view of the new ground(s) of rejection.

The applicant has amended independent claims 16 and 20 to remove the word "thereby", which the examiner had previously indicated [p. 2 of the office action of 13 July 2007] required the method of claim 16 to have the diameter determined by the act of discharging the droplets such that they have the said weight, rather than being due to other features such as the recessed portions in *Hsieh*. The current amendment therefore removes this distinguishing feature over *Hsieh* (and similar prior art) in which the diameter of the droplets is determined by features on the substrate.

The applicant has amended independent claims 16 and 20 to add the limitation that "a joined portion of the liquid droplets is located at a boundary of the pixel regions". In the cited Fig. 3 of the *Hsieh* reference, the liquid droplets in neighboring pixel regions are separated by cell structure [150] along the pixel region boundaries, so there is no joined portion of the droplets at a boundary of the pixel regions. This language therefore distinguishes over that figure of *Hsieh*. However, Figs. 7A-F of *Hsieh* show neighboring pixel regions which have passages [630] through the cell structure, so in these embodiments there is a joined portion of the liquid droplets located at a boundary of the pixel region. Rejections based on Fig. 7 of *Hsieh* are therefore made below.

The applicant argues that the added limitation distinguishes over the *Masazumi* reference. The examiner agrees that *Masazumi* does not disclose a joined portion of the liquid droplets being located at a boundary of the pixel regions [there is a wall 9b' between the regions, so the neighboring liquid droplets do not touch]. The previous rejections of the method claims 16, 17, and 27 in view of *Masazumi* are therefore overcome.

Regarding the device claims 20, 22, and 28, the amended limitation that the device discharges droplets such that a joined portion of the liquid droplets is located at a boundary of the pixel regions does not distinguish over the previous rejections, since this is in effect a limitation regarding the intended use of the device (or regarding the LCD formed by use of the device), and the previously cited devices are clearly capable of placing droplets such that the limitation is satisfied.

To summarize the rejections, the method claims are presently rejected over *Hsieh* since the claim language does not exclude having the diameter of droplets determined to be roughly equal to the arrangement pitch of the pixel regions by features on the substrate ("thereby") and since the "joined portion" limitation does not distinguish over making the structure of Fig. 7 of *Hsieh*. The device claims are presently rejected over both *Hsieh* and *Masazumi* since they do not patentably distinguish the device itself over what is disclosed by the prior art.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 20, 22, and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Masazumi et al.*, U.S. Patent No. 6,331,884 in view of *Hashizume et al.*, US 2002/0062787 and further in view of *Yamamoto et al.*, Japanese Patent Document No. 09-138410.

Masazumi discloses [see Fig. 5, for instance] a liquid crystal discharging device comprising a discharge unit for discharging liquid crystal to arrange the liquid crystal on a substrate on which a plurality of pixel regions composed of a plurality of pixels are formed, the discharge unit including a plurality of nozzles [N2, N3, N4] for discharging the liquid crystal [9a, 9a', 9a''] in a form of liquid droplets, the liquid crystal arrangement

device discharges the liquid droplets from the nozzles such that each of the liquid droplets has a certain amount and the diameter of the liquid droplets after impact is roughly equal to the arrangement pitch of the plurality of pixel regions [see Fig. 1B; note that since the resin 9b constitutes a non-display area, it will have a small size relative to the pixel display area, so the diameter will be "roughly equal" to arrangement pitch, within the scope of how the examiner understands that relative term; also note that the resin does not act to define the placement of the liquid crystal as the recessed portions in *Hsieh* do], to coat each of the plurality of pixel regions with the liquid droplets.

Masazumi does not disclose a weight measurement device which measures a weight of a single liquid droplet for obtaining a diameter and determining an arrangement pitch of the liquid droplets to be arranged in line on the substrate based on the diameter of the liquid droplets after impact of the liquid droplets on the substrate, which was measured in advance. *Masazumi* appears to be silent on how the amount of the liquid crystal dropped is determined.

Hashizumi discloses [see paragraphs 0103-0104, for instance] an analogous discharge unit with a weight measurement device [54] which measures a weight of the single liquid droplet, enabling the discharge unit to discharge the liquid droplets from the nozzles such that each of the liquid droplets has said weight. It would have been obvious to one of ordinary skill in the art at the time of the invention to have such a weight measurement device, motivated by the teaching of *Hashizumi* that this allows the drop sizes to be constant, despite environmental (or other) changes during the processing.

Yamamoto teaches [see Fig. 7] that when using an ink-jet/nozzle technique, the diameter of the liquid droplets after impact of the liquid droplets on the substrate should be considered, since having droplets too far apart [as in Fig. 7b] leads to separated droplets on the substrate and an uneven coverage of the substrate, for instance. It would therefore have been obvious to one of ordinary skill in the art at the time of the invention to use a method in which an arrangement pitch of the liquid droplets is determined based on a diameter of the liquid droplets after impact on the substrate, which would have to be measured in advance (or the teaching could not be applied).

The additional limitation of claim 20 is that a joined portion of the liquid droplets is located at a boundary of the pixel regions. This is in effect a limitation on the intended use of the device; the device disclosed by the prior art is capable of performing this function, so the limitation does not distinguish the claimed device over the prior art.

In order to function, this device necessarily has a controller as recited in claim 20 and a drive system as recited in claim 22. Claims 20 and 22 are therefore unpatentable.

Masazumi does not disclose that the arrangement pitch is obtained by selecting a subset of the nozzles having a pitch therebetween equal to the arrangement pitch, among the plural nozzles. The examiner takes official notice that ink-jet heads having a plurality of nozzles, with only a subset of nozzles being activated at a given instant, are well-known in the art [this assertion was not traversed by the applicant, so it is now considered admitted prior art, see MPEP 2144.03]. It would have been obvious to one of ordinary skill in the art at the time of the invention to do so, motivated by the desire to

have the flexibility to use an available nozzle head and selecting a subset of its nozzles having the desired arrangement pitch, rather than having to obtain a specially designed nozzle head having its nozzle arrangement matching the pixel arrangement (which can vary for different devices which would beneficially be manufactured using the same equipment). The controller would thereby control the interval by selecting the nozzles having a pitch therebetween equal to the arrangement pitch, among the plural nozzles. Claim 28 is therefore unpatentable.

5. Claims 16, 17, 20, and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Hsieh et al.*, U.S. Patent No. 6,867,840 in view of *Hashizume et al.*, US 2002/0062787 and further in view of *Yamamoto et al.*, Japanese Patent Document No. 09-138410.

Considering claim 20, *Hsieh* discloses [see Figs. 3E and 7, for instance] a liquid crystal discharging device comprising a discharge unit for discharging liquid crystal [170] to arrange the liquid crystal on a substrate [100] on which a plurality of pixel regions composed of a plurality of pixels are formed, the discharge unit comprising a plurality of nozzles which discharge liquid crystal in a form of liquid droplets, with each of the plurality of pixel regions being coated with the liquid droplets. As shown in Fig. 7, due to the passages [630] through the walls around the pixel regions, there is a joined portion of the liquid droplets which is located at a boundary of the pixel regions.

Hsieh does not disclose a weight measurement device which measures a weight of the single liquid droplet, and the discharge unit discharging the liquid droplets from the nozzles such that each of the liquid droplets has said weight and thereby the

diameter of the liquid droplets after impact is roughly equal to the arrangement pitch of the plurality of pixel regions, and each of the plurality of pixel regions is coated with the liquid droplets.

Hashizumi discloses [see paragraphs 0103-0104, for instance] an analogous discharge unit with a weight measurement device [54] which measures a weight of the single liquid droplet, enabling the discharge unit to discharge the liquid droplets from the nozzles such that each of the liquid droplets has said weight. It would have been obvious to one of ordinary skill in the art at the time of the invention to have such a weight measurement device, motivated by the teaching of *Hashizumi* that this allows the drop sizes to be constant, despite environmental (or other) changes during the processing.

Hsieh also does not disclose that there is a controller that controls an interval between the liquid crystal discharged from the nozzles based on a diameter of the liquid droplets after impact of the liquid droplets on the substrate, which was measured in advance. This has two parts: the controller, and what is considered when determining the arrangement pitch of the liquid droplets.

Yamamoto discloses [see Fig. 7] having the nozzles move along the substrate at a certain rate; this inherently requires a controller which controls the rate and thus the interval between the droplets. *Yamamoto* also teaches [see Fig. 7] that when using an ink-jet/nozzle technique, the diameter of the liquid droplets after impact of the liquid droplets on the substrate should be considered, since having droplets too far apart [as in Fig. 7b] leads to separated droplets on the substrate and an uneven coverage of the

substrate, for instance. It would therefore have been obvious to one of ordinary skill in the art at the time of the invention to use a method in which an interval between the liquid droplets is determined based on a diameter of the liquid droplets after impact on the substrate, which would have to be measured in advance (or the teaching could not be applied).

Claim 20 is therefore unpatentable.

Considering claim 22, *Hsieh* appears to disclose aligning each impact location of the liquid droplets with each location of the pixel regions (if not, this would have been an obvious matter of optimization). However, *Hsieh* does not disclose a drive system for moving the nozzle and the substrate relative to each other (*Hsieh* shows only a cross-sectional slice of its device, and is silent on how the entire substrate is covered).

Yamamoto discloses [see Figs. 6 and 7, for instance] an inkjet device with a plurality of nozzles [Fig. 6] as shown in *Hsieh*, which covers the entire substrate by being moved by a drive system [inherent in Fig. 7]. It would have been obvious to one of ordinary skill in the art at the time of the invention to use such a drive system in the device of *Hsieh*, motivated by the desire to use a single small set of nozzles to efficiently and flexibly cover substrates of varying sizes. Claim 22 is therefore unpatentable.

The use of the arrangement device discussed above results in the method recited in claim 16, determining an arranged pitch of the liquid droplets to be arranged in line [left to right in Fig. 7 of *Yamamoto*], with the interval determined as recited, measuring the weight of the droplet for obtaining the desired diameter, and discharging

the liquid droplets from nozzles while maintaining the arrangement pitch, so claim 16 is also unpatentable.

The arrangement pitch, as seen from *Yamamoto*, is a result-effective variable whose optimization would have been obvious to one of ordinary skill in the art at the time of the invention. Furthermore, *Yamamoto* teaches having it be roughly equal to the diameter of the liquid droplets after impact (to obtain even coverage over the substrate). Claim 17 is therefore unpatentable.

6. Claims 27 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Hsieh et al.*, U.S. Patent No. 6,867,840 in view of *Hashizume et al.*, US 2002/0062787 and *Yamamoto et al.*, Japanese Patent Document No. 09-138410 as applied above, and further in view of *Yamamoto et al.*, US 2004/0201818.

Yamamoto '818 discloses [see Fig. 5] a ink-jet nozzle system in which the nozzles are controllable (by a controller). It would have been obvious to one of ordinary skill in the art at the time of the invention to use such an ink-jet system, motivated by the desirability of being able to control the nozzles to turn on and off.

In the device and method discussed above, liquid is dropped from all the nozzles shown in *Hsieh* and *Yamamoto*; alternatively stated, the arrangement pitch is obtained by selecting all the nozzles, and the nozzles have a pitch equal to the arrangement pitch, among the plural nozzles. Similarly, the controller controls the interval in part by selecting all the nozzles, as well as in part by selecting the drive speed. The above device and method do not disclose that the arrangement pitch is obtained by selecting a subset of the nozzles having a pitch therebetween equal to the arrangement pitch,

among the plural nozzles. The examiner takes official notice that ink-jet heads having a plurality of nozzles, with only a subset of nozzles being activated at a given instant, are well-known in the art [this assertion was not traversed by the applicant, so it is now considered admitted prior art, see MPEP 2144.03]. It would have been obvious to one of ordinary skill in the art at the time of the invention to do so, motivated by the desire to have the flexibility to use an available nozzle head and selecting a subset of its nozzles having the desired arrangement pitch, rather than having to obtain a specially designed nozzle head having its nozzle arrangement matching the pixel arrangement (which can vary for different devices which would beneficially be manufactured using the same equipment). The controller would thereby control the interval by selecting the nozzles having a pitch therebetween equal to the arrangement pitch, among the plural nozzles. Claims 27 and 28 are therefore unpatentable.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Andrew Schechter whose telephone number is (571) 272-2302. The examiner can normally be reached on Monday - Friday, 9:00 - 5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Nelms can be reached on (571) 272-1787. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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24 December 2007